REMARKS

The applicant respectfully requests reconsideration in view of the amendment and the following remarks. Support for newly added claim 20 can be found in the published specification (US 2006/0079718) in paragraph nos. 0002 and 0034. Support for newly added claims 21 and 22 can be found in the published specification in paragraph no. 0017. Support for newly added claims 23 and 24 can be found in the published specification in paragraph no. 0012. No additional fee is required for the extra claims. The application contains twenty total claims.

The Examiner has rejected claim 4 under 35 U.S.C. 103(a) as being unpatentable over US 2,660,598 ("Hoffert") and in view of US 6,294,633 ("Hidaka"). The applicant respectfully traverses these rejections.

In claim 4 of the present application, a reactor is claimed, in which a shape selective fixed-bed catalyst is present, and in which through interior tubes a coolant is passed. This means that in the reactor as claimed the presence of a shape-selective fixed-bed catalyst is combined with interior cooling tubes which enable the reactor to be operated isothermally. Shape-selective in the sense of the present application means that the catalysts that are used have a high selectivity for methylamine and dimethylamine, but have a low selectivity for trimethylamine, see page 2, lines 11 to 18 of the description, based on their pore sizes.

The applicant believes that this specific combination of a shape-selective catalyst which is present in an isothermally operated reactor for the production of alkyl amines from C_{1-4}-alkanols and ammonia is non obvious in light of the Hoffert in view of Hidaka.

Hoffert discloses a reactor for the catalytic conversion of gaseous reactants. It is further disclosed that a continuous operation of catalytic processes shall be conducted in the presence of a catalyst composed of relatively large particles maintained in a mass or bed under relatively static or quiescent conditions, see column 1, lines 8 to 12. According to column 1, lines 19 to 24, fine suspended particles are located between the catalyst particles in order to improve the heat transfer between the surfaces of the catalyst and the heat transfer surfaces. Furthermore, according to column 1, lines 25 to 27of Hoffert, Hoffert's reactor is suitable for the synthesis of hydrocarbons and the like. The catalysts that are present in the reactor according to Hoffert can be chosen from catalysts comprising a metal of the iron group or ruthenium, optionally supported on a suitable carrier like diatomaceous earth, silica gel, Filtriol, etc, see column 2, lines 28 to 44.

Hoffert does not disclose that the reactor is suitable for the production of methylamines according to the present invention. In addition, Hoffert does not disclose that a shape-selective catalyst shall be present in the reactor for the production of alkylamines such as methylamines (see claim 20).

Hidaka discloses a catalyst for producing methyl amines comprising mordenite of spherical fine particles having a particle size of, for example, 1 to 2 mm, see abstract and example 1. The catalysts according to Hidaka have a high selectivity towards dimethylamine, see column 2, lines 20 to 25. According to column 4, lines 56 to 67, the production of methylamines according to Hidaka can be conducted at temperatures of 200 to 400 ^{0}C. Hidaka does not disclose that the production shall be conducted in a reactor that is operated isothermally.

The Examiner has stated in the Office Action, that the combination of the cited U.S. patents would suggest a person having ordinary skill in the art a reactor according to claim 4 of the present application.

The object of the present invention is to provide a reactor in which lower alkyl amines such as methylamines can be prepared having high ratios of dimethylamine and monomethylamine, and having a low ratio of trimethylamine. In addition, the operating life of the catalyst shall be improved and so called "hot spots" shall be avoided, which would decrease the amount of dimethylamine and would increase the amount of trimethylamine, see page 2, lines 20 to 29 of the description.

These objects are solved byte reactor according claim 4 of the present invention.

The presence of a shape-selective catalyst makes it possible that monomethylamine and dimethylamine are obtained in high amounts, whereas trimethylamine is obtained in a low amount. In addition, the presence of tubes in the reactor through which a coolant can be passed allows the isothermal operating of the reactor, so that the difference between inlet and outlet temperature is lower than 60^{0}C, preferably lower than 35 ^{0}C, see page 4, lines 23 to 27 of the description. The inventive combination of a reactor that can be operated isothermally and the use of shape-selective catalysts make it possible to obtain high ratios of mono- and dimethylamine and low amounts of trimethylamine in the product mixture, see page 3, line 36 to page 4, line 1 of the description.

The applicant believes that a person having ordinary skill would not combine Hoffert in view of the cited documents.

As stated above, Hoffert does not point in the direction that the reactor as disclosed

would be a suitable one for the preparation of alkyl amines from C_{1-4}-alkanols with ammonia in the gas phase. Again, Hoffert discloses that this reactor is suitable for the synthesis of hydrocarbons, oxygenated hydrocarbons and the like. A person having the object to provide a reactor for the production of methylamines would not take the reactor according to Hoffert into account. Furthermore, Hoffert does not suggest that the difference between inlet and outlet temperature shall be minimized as it has been found by the inventors, see above (claims 21 and 22). Hoffert does not suggest any temperatures or temperature profiles that shall be present in the reactor. Because Hoffert does not suggest that the reactor disclosed therein is suitable for the production of methylamines, a person having ordinary skill in the art can not learn from this document, that a small difference in inlet and outlet temperature and the avoidance of so called "hot spots" makes it possible to obtain high amounts of dimethylamines and low amounts of trimethylamines, see page 2, lines 20 to 29 of the description.

In addition, Hidaka does not disclose or suggest that the preparation of methylamines shall be operated isothermally if catalysts according to this document are used. Therefore, a person having ordinary skill in the art can not learn from Hidaka that an isothermally operated reaction for the preparation of methylamines gives the advantages as mentioned above. Furthermore, Hidaka does not point out the problem of a good heat removal, because the process according to Hidaka is conducted in a tube having a length of only 300 mm and a diameter of only 13 φ, see column 5, lines 1 to 10. This means that Hidaka discloses the reaction in a reactor having laboratory scale. Because heat removal in such a small reactor is no problem, a person having ordinary skill in the art does not learn from this document that the presence of cooling tubes in the catalyst mass helps avoiding "hot spots". Therefore, starting from Hidaka a skilled person would not take the reactor according to Hoffert into account having cooling tubes in the reactor.

Therefore, the applicant believes that a person having ordinary skill in the art would not combine the Hoffet in view of Hidaka. In Hoffert, it is not pointed in the direction that the disclosed reactor is suited for the preparation of methylamines or that such a preparation shall be conducted isothermally. Therefore, a person having ordinary skill in the art would not learn from Hoffert that a shape-selective catalyst has advantages in the preparation of methylamines, when it is operated isothermally. A skilled person having the objects as cited above would therefore not take Hoffert into account.

In addition, a person having ordinary skill in the art does not learn from Hidaka that the

disclosed catalysts shall advantageously be used in a reactor that is operated isothermally.

Therefore, a skilled person, knowing of Hidaka would not look for a reactor that can be operated isothermally, because no pointer in this direction is given in Hidaka. Therefore, from the applicant believes that the reactor according to claim 4 of the present application is non-obvious in light of the documents cited by the examiner.

In view of the above amendment, applicant believes the pending application is in condition for allowance. Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 13156-00011-US from which the undersigned is authorized to draw.

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Respectfully submitted,

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